

WHAT IS CLAIMED IS:

1. An organic polymer gel obtained by polymerizing a monomer comprising an ionic surfactant moiety and a polymerizable organic counter ion in the presence of a cross-linking agent at or above the surfactant's critical micelle concentration.
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2. The organic polymer gel of claim 1 which has a micelle structure having inwardly oriented hydrophobic groups of the surfactant and an outer shell of polymerized organic counter ions bound to the hydrophilic groups of the surfactant.
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3. The organic polymer gel of claim 1, wherein the ionic surfactant is a cationic surfactant selected from halogenated and ethylsulfated alkyltrimethylammonium.
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4. The organic polymer gel of claim 3, wherein the alkyl is C₇₋₄₀ alkyl.
5. The organic polymer gel of claim 3, wherein the monomer is selected from the group consisting of alkyltrimethylammonium acrylate, alkyltrimethylammonium (met)acrylate, alkyltrimethylammonium vinylacetate, alkyltrimethylammonium vinylbenzoate, alkyltrimethylammonium vinylphosphonate, alkyltrimethylammonium vinylsulfonate, alkyltrimethylammonium vinylbenzenesulfonate, alkyltriethylammonium acrylate, alkyltriethylammonium (met)acrylate, alkyltriethylammonium vinylacetate, alkyltriethylammonium vinylbenzoate, alkyltriethylammonium vinylphosphonate, alkyltriethylammonium vinylsulfonate and alkyltriethylammonium vinylbenzenesulfonate.
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6. The organic polymer gel of claim 5, wherein the monomer is selected from the group consisting of decyltrimethylammonium acrylate, decyltrimethylammonium (met)acrylate, decyltrimethylammonium vinylacetate, decyltrimethylammonium vinylbenzoate,
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5 decyltrimethylammonium vinylphosphonate, decyltrimethylammonium
vinylsulfonate, decyltrimethylammonium vinylbenzenesulfonate,
decyltriethylammonium acrylate, decyltriethylammonium (met)acrylate,
decyltriethylammonium vinylacetate, decyltriethylammonium vinylbenzoate,
10 decyltriethylammonium vinylphosphonate, decyltriethylammonium
vinylsulfonate, decyltriethylammonium vinylbenzenesulfonate,
cetyltrimethylammonium acrylate, cetyltrimethylammonium (met)acrylate,
cetyltrimethylammonium vinylacetate, cetyltrimethylammonium vinylbenzoate,
cetyltrimethylammonium vinylphosphonate, cetyltrimethylammonium
15 vinylsulfonate, cetyltrimethylammonium vinylbenzenesulfonate,
cetyltriethylammonium acrylate, cetyltriethylammonium (met)acrylate,
cetyltriethylammonium vinylacetate, cetyltriethylammonium vinylbenzoate,
cetyltriethylammonium vinylphosphonate, cetyltriethylammonium
vinylsulfonate and cetyltriethylammonium vinylbenzenesulfonate.

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7. The organic polymer gel of claim 1, wherein the ionic surfactant is an anionic surfactant having an anionic group of $-COO^-$, $-SO_3^-$, $-OSO_3^-$ or $-PO_3^{2-}$.

20 8. The organic polymer gel of claim 7, wherein the monomer is selected from the group consisting of vinylpyridinium alkylcarboxylate, vinylpyridinium alkylbenzoate, vinylpyridinium alkylsulfonate, vinylpyridinium benzenesulfonate, vinylpyridinium alkylphosphonate, allyltrimethylammonium alkylcarboxylate, allyltrimethylammonium alkylsulfonate, 25 allyltrimethylammonium alkylbenzoate, allyltrimethylammonium alkylsulfonate, allyltrimethylammonium alkylphosphonate and allyltrimethylammonium alkylphosphonate.

9. The organic polymer gel of claim 8, wherein the alkyl is C_{7-40} alkyl.

30 10. The organic polymer gel of claim 1, wherein the polymerizable group contained in the polymerizable organic counter ion is a vinyl or ethoxy group.

11. The organic polymer gel of claim 1, wherein the cross-linking agent is

a compound having at least two double bonds.

12. The organic polymer gel of claim 11, wherein the cross-linking agent is selected from the group consisting of methylenebisacrylamide (MBA), divinylbenzene, trimethylolpropane ethoxylate (1/3EO/OH) methylether diacylate (TPE-1), trimethylolpropane ethoxylate (7/3EO/OH) methylether diacylate (TPE-7), trimethylolpropane ethoxylate (14/3EO/OH) methylether diacylate (TPE-14), trimethylolpropane and a mixture thereof.

10 13. The organic polymer gel of claim 1, wherein the cross-linking agent is added in an amount of 0.01 to 5 mol based on a mol of the monomer.

14. The organic polymer gel of claim 1, wherein the polymerization is carried out at room temperature to 100°C for 2 to 12 hours.

15 15. A method for separating an ionic or water-soluble material from a solution containing the ionic or water-soluble material using the organic polymer gel of any one of claims 1 to 14.

20 16. The method of claim 15, wherein the ionic material is a dye selected from the group consisting of methyl orange, methyl red, methyl green, rhodamine B and methyl violet.

25 17. The method of claim 15, wherein the water-soluble material is bromocresol purple or phenol red.

30 18. An inorganic polymer gel obtained by condensation polymerization of a surfactant and an inorganic compound having a reactive group which is condensable with the surfactant at or above the surfactant's critical micelle concentration.

19. The inorganic polymer gel of claim 18, wherein the surfactant is a cationic surfactant selected from halogenated and ethylsulfated

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alkyltrimethylammonium.

20. The inorganic polymer gel of claim 19, wherein the alkyl is C₇₋₄₀ alkyl.

5 21. The inorganic polymer gel of claim 18, wherein the surfactant is an anionic surfactant having an anionic group of -COO⁻, -SO₃⁻, -OSO₃⁻² or -PO₃⁻².

10 22. The inorganic polymer gel of claim 18, wherein the inorganic compound is selected from the group consisting of tetramethylorthosilicate, tetraethylorthosilicate, titanium tetraethoxide, aluminum isopropoxide, trimethylborate, chlorodimethylalkylsilane and sodium silicate.

15 23. The inorganic polymer gel of claim 18, wherein the condensation polymerization is carried out at 0 to 120°C for 0.1 to 100 hours.

24. The inorganic polymer gel of claim 18, wherein the surfactant is added in an amount of 0.05 to 0.5 mole based on a mole of the inorganic compound.

20 25. A method for separating an ionic or water-soluble material from a solution containing the ionic or water-soluble material using the inorganic polymer gel of any one of claims 18 to 24.

25 26. The method of claim 25, wherein the ionic material is selected a dye from the group consisting of methyl orange, methyl red, methyl green, rhodamine B and methyl violet.

27. The method of claim 25, wherein the water-soluble material is bromocresol purple or phenol red.